WHAT IS CLAIMED IS:

1. A device for checking and managing the operating and diagnostic conditions of a mechanical seal in a machine, where the device automatically and continuously regulates a first pressure inside the mechanical seal depending on a second measured pressure in the machine in order to keep constant an optimum difference between the first pressure and the second pressure, the device comprising:

a) one or more than one pressure regulator operatively connected on one side to a pressurization line and on another side to a supply line for a fluid for the mechanical seal;

b) one or more than one transducer which detects a measured value of the first pressure in the mechanical seal;

c) one or more than one converter which drives the pressure regulator; and

d) one or more than one microprocessor, the microprocessor running a regulating algorithm for the converter, the pressure regulator and the one transducer;

where the regulating algorithm enables the device to perform one or more than one of the following functions:

i) regulating the first pressure in the mechanical seal detected by the transducer and the second pressure in the machine by comparing the first pressure with a desired pressure setpoint value, the setpoint value being the sum of the second pressure and an optimum set pressure difference recommended by a manufacturer of the mechanical seal;

ii) regulating a flow-rate of the mechanical seal;

iii) checking the integrity of the mechanical seal based on detection and evaluation of actual pressure leakage;

iv) checking for anomalies in the mechanical seal;

v) counting operating hours of the mechanical seal;

vi) displaying and recording data for the mechanical seal; and

vii) interfacing with other apparata or automated systems.

2. The device according to claim 1, where the pressure regulator comprises a 2-way proportional valve.

3. The device according to claim 1, where the pressure regulator comprises a 3-way proportional valve.

4. The device according to claim 1, where the transducer is adapted to measure the

18

pressure in the pressurization line output from the device and the pressure inside the mechanical seal.

5. The device according to claim 1, where the regulating algorithm controls the pressure regulator.

6. The device according to claim 1, further comprising a minimum pressure switch for generating a low pressure alarm, the minimum pressure switch connected between the pressure regulator and the fluid supply line.

7. The device according to claim 1, further comprising means for counting the operating hours of the mechanical seal.

8. The device according to claim 7, where the means for counting the operating hours of the mechanical seal, perform the counting depending on the mechanical seal pressurization pressure and the pressure inside the machine.

9. The device according to claim 1, further comprising means for receiving an output signal allowing other apparata to monitor the operation of the device.

10. The device according to claim 1, further comprising a display and a keyboard for changing operating parameters and for displaying past and present data, and comprises a mass storage for recording the data.

11. The device according to claim 10, where the mass storage is a solid-state mass storage.

12. A device for regulating the pressure inside of a mechanical seal comprising means for regulating the pressure inside of the mechanical seal, where the means for regulating maintain an optimum pressure difference between pressure inside the mechanical seal and pressure inside a machine in which the mechanical seal is installed.

13. A method of controlling and managing the operating and diagnostic conditions of a mechanical seal, the method comprising:

a) providing a device according to claim 1;

b) connecting the device to the mechanical seal; and

c) activating the device, thereby controlling and managing the operating and diagnostic conditions of the mechanical seal.

14. A method of regulating the pressure inside of the mechanical seal, the method comprising:

a) providing a device according to claim 12;

b) connecting the device to the mechanical seal; and

c) activating the device, thereby regulating the pressure inside of the mechanical seal.

15. A method of controlling and managing the operating and diagnostic conditions of a mechanical seal, the method comprising:

a) an activation step;

b) an operation enabling checking step;

c) an anomalies checking step resulting in the detection of anomalies or the detection of no anomalies, and performed only in case of positive result in step b);

d) an integrity control request checking step performed only in case of no anomalies detected in the step c);

e) a pressure regulating step performed only in case of negative check in the step d);

f) a flowing need checking step;

g) a flow-rate regulating step bypassed in case of negative check in the step f);

h) an operating hours counting step;

i) a data displaying and recording step;

j) an interfacing step with other systems; and

k) repeating steps b) through j).

16. The method of claim 15, additionally comprising the following steps in case of a negative check in step b):

l) a configuration modify request checking step;

m) a system reconfiguring step bypassed in case of negative check in step l);

n) a command resetting step;

o) a data displaying and recording step; and

p) an interfacing step with other systems.

17. The method of claim 15, additionally comprising the following steps in case of a positive check in step d):

q) an integrity checking step;

r) an alarm managing step bypassed in case of no alarms detected in the step q);

s) an operating hours counting step;

20

t) a data displaying and recording step; and

u) an interfacing step with other systems.

18. The method of claim 15, additionally comprising the following steps in case of the detection of anomalies in step c):

5

v) an alarm managing step;

w) an operating hours counting step;

x) a data displaying and recording step; and

.y) an interfacing step with other systems.